What is claimed is:

1. A method of extracting physical model parameters, comprising the steps of:

(a) adopting a physical model for physical properties that provide characteristic quantity sets $g_i$ ($i = 1, 2, ..., m$) each consisting of the first to z-th ($z \geqq 2$) characteristic quantities $g_{iy}$ ($y = 1, 2, ..., z$), corresponding to a plurality of extrinsic factor sets $v_i$, respectively, each of which consists of at least one extrinsic factor, said physical model expressing a calculated value of each characteristic quantity set $g_s$ (s is any one value of i) as a function $f_y$ ($v_s$, P) of corresponding one extrinsic factor set $v_s$ and a parameter set P consisting of a plurality of parameters; and

(b) obtaining an error function S by summing values each of which are obtained by dividing the square of the difference between each of said characteristic quantities $g_{iy}$ and corresponding function $f_y$ ($v_i$, P) by variance $\sigma_{iy}^2$ of observed values of said characteristic quantities $g_{iy}$ obtained by observing said physical properties of a plurality of samples, for the plural number of extrinsic factor sets and extracting said parameter set P that gives the minimum value of said error function S.

2. The method of extracting physical model parameters according to claim 1, wherein

said step (b) is the step of:

(b-a) extracting said parameter set P that gives the minimum value of said error function S by obtaining said error function S repeatedly with said parameter set P updated, and

said step (b) includes the step of:

(b-1) verifying if said function $f_y$ ($v_s$, P) obtained by calculation using updated

parameter set P reproduces said observed values of each characteristic quantity set $g_s$ obtained from said plurality of samples by utilizing conformity of the value of said error function S to $\chi^2$ distribution and extracting said parameter set P at that time as one that gives the minimum value of said error function S when said function $f_y$ ($v_s$, P) reproduces the observed values.

3. The method of extracting physical model parameters according to claim 2, wherein

said step (b) is the step of:

obtaining said error function S repeatedly with said parameter set P updated while maintaining a probability Q of increasing the value of said error function S positive.

4. The method of extracting physical model parameters according to claim 3, wherein

said probability Q is obtained on the basis of a predetermined amount which fluctuates monotonously as said parameter set P is updated, and

said predetermined amount contributes to a tendency to decrease said probability Q as said parameter set P is updated.

5. The method of extracting physical model parameters according to claim 2, wherein

said step (b) is the step of:

updating said parameter set P only in such a direction that the error function S decreases monotonously.

6. The method of extracting physical model parameters according to claim 5, wherein

Gauss-Newton method is adopted in said step (b).

7. The method of extracting physical model parameters according to claim 5, wherein

Levenberg-Marquardt method is adopted in said step (b).

8. The method of extracting physical model parameters according to claim 2, wherein

said step (b) further includes the steps of:

(b-2) judging if the value of said error function S obtained with said parameter set P updated is considered as the minimum value when said function $f_y$ ($v_s$, P) does not reproduce said observed values of said characteristic quantity set $g_s$ obtained from said plurality of samples in said step (b-1) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the value of said error function S is considered as the minimum value; and

(b-3) judging if the number of updates exceeds a predetermined number of times when the value of said error function S is not considered as the minimum value in said step (b-2) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the number of updates exceeds said predetermined number of times or obtaining the value of said error function S with said parameter set P updated to go back to said step (b-1) when the number of updates does not exceed said predetermined number of times.

9. The method of extracting physical model parameters according to claim 8, wherein

the method used in said step (b-a) of extracting said parameter set P that gives the minimum value of said error function S is changed to execute said steps (b-1) to (b-3) again, instead of extracting said parameter set P at that time as one that gives the minimum value of said error function S, when it is judged that the number of updates exceeds said predetermined number of times in said step (b-3).

10. A computer-readable storage medium for storing a program that causes a computer to execute a method of extracting physical model parameters independently or in combination with a program previously stored in said computer,

wherein said method of extracting physical model parameters comprises the steps of:

(a) adopting a physical model for physical properties that provide characteristic quantity sets $g_i$ ($i = 1, 2, ..., m$) each consisting of the first to z-th ($z \geqq 2$) characteristic quantities $g_{iy}$ ($y = 1, 2, ..., z$), corresponding to a plurality of extrinsic factor sets $v_i$, respectively, each of which consists of at least one extrinsic factor, said physical model expressing a calculated value of each characteristic quantity set $g_s$ (s is any one value of i) as a function $f_y$ ($v_s$, P) of corresponding one extrinsic factor set $v_s$ and a parameter set P consisting of a plurality of parameters; and

(b) obtaining an error function S by summing values each of which are obtained by dividing the square of the difference between each of said characteristic quantities $g_{iy}$ and corresponding function $f_y$ ($v_i$, P) by variance $\sigma_{iy}^2$ of observed values of said characteristic quantities $g_{iy}$ obtained by observing said physical properties of a plurality of samples, for the plural number of extrinsic factor sets and extracting said parameter set P

that gives the minimum value of said error function S.

11. The computer-readable storage medium according to claim 10, wherein said step (b) in the method of extracting physical model parameters is the step of:

(b-a) extracting said parameter set P that gives the minimum value of said error function S by obtaining said error function S repeatedly with said parameter set P updated, and

said step (b) in the method of extracting physical model parameters includes the step of:

(b-1) verifying if said function $f_y$ ($v_s$, P) obtained by calculation using updated parameter set P reproduces said observed values of each characteristic quantity set $g_s$ obtained from said plurality of samples by utilizing conformity of the value of said error function S to $\chi^2$ distribution and extracting said parameter set P at that time as one that gives the minimum value of said error function S when said function $f_y$ ($v_s$, P) reproduces the observed values.

12. The computer-readable storage medium according to claim 11, wherein said step (b) in the method of extracting physical model parameters is the step of:

obtaining said error function S repeatedly with said parameter set P updated while maintaining a probability Q of increasing the value of said error function S positive.

13. The computer-readable storage medium according to claim 11, wherein said step (b) in the method of extracting physical model parameters is the step

of:

updating said parameter set P only in such a direction that the error function S decreases monotonously.

14. The computer-readable storage medium according to claim 11, wherein

said step (b) in the method of extracting physical model parameters further includes the steps of:

(b-2) judging if the value of said error function S obtained with said parameter set P updated is considered as the minimum value when said function $f_y$ ($v_s$, P) does not reproduce said observed values of said characteristic quantity set $g_s$ obtained from said plurality of samples in said step (b-1) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the value of said error function S is considered as the minimum value; and

(b-3) judging if the number of updates exceeds a predetermined number of times when the value of said error function S is not considered as the minimum value in said step (b-2) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the number of updates exceeds said predetermined number of times or obtaining the value of said error function S with said parameter set P updated to go back to said step (b-1) when the number of updates does not exceed said predetermined number of times.

15. The computer-readable storage medium according to claim 14, wherein

the method used in said step (b-a) of extracting said parameter set P that gives the minimum value of said error function S is changed to execute said steps (b-1) to (b-3) of the method of extracting physical model parameters again, instead of extracting said

parameter set P at that time as one that gives the minimum value of said error function S, when it is judged that the number of updates exceeds said predetermined number of times in said step (b-3) of the method of extracting physical model parameters.

16. A method of manufacturing a non-linear element for manufacturing a non-linear element by performing:

a characteristic simulation which adopts device modeling using a method of extracting physical model parameters; and

a physical process on the basis of said characteristic simulation,

wherein said method of extracting physical model parameters comprising the steps of:

(a) adopting a physical model for physical properties that provide characteristic quantity sets $g_i$ ($i = 1, 2, ..., m$) each consisting of the first to z-th ($z \geqq 2$) characteristic quantities $g_{iy}$ ($y = 1, 2, ..., z$), corresponding to a plurality of extrinsic factor sets $v_i$, respectively, each of which consists of at least one extrinsic factor, said physical model expressing a calculated value of each characteristic quantity set $g_s$ (s is any one value of i) as a function $f_y$ ($v_s$, P) of corresponding one extrinsic factor set $v_s$ and a parameter set P consisting of a plurality of parameters; and

(b) obtaining an error function S by summing values each of which are obtained by dividing the square of the difference between each of said characteristic quantities $g_{iy}$ and corresponding function $f_y$ ($v_i$, P) by variance $\sigma_{iy}^2$ of observed values of said characteristic quantities $g_{iy}$ obtained by observing said physical properties of a plurality of samples, for the plural number of extrinsic factor sets and extracting said parameter set P that gives the minimum value of said error function S.

17. The method of manufacturing a non-linear element according to claim 16, wherein

said step (b) in the method of extracting physical model parameters is the step of:

(b-a) extracting said parameter set P that gives the minimum value of said error function S by obtaining said error function S repeatedly with said parameter set P updated, and

said step (b) in the method of extracting physical model parameters includes the step of:

(b-1) verifying if said function $f_y$ ($v_s$, P) obtained by calculation using updated parameter set P reproduces said observed values of each characteristic quantity set $g_s$ obtained from said plurality of samples by utilizing conformity of the value of said error function S to $\chi^2$ distribution and extracting said parameter set P at that time as one that gives the minimum value of said error function S when said function $f_y$ ($v_s$, P) reproduces the observed values.

18. The method of manufacturing a non-linear element according to claim 17, wherein

said step (b) in the method of extracting physical model parameters further includes the step of:

(b-2) judging if the value of said error function S obtained with said parameter set P updated is considered as the minimum value when said function $f_y$ ($v_s$, P) does not reproduce said observed values of said characteristic quantity set $g_s$ obtained from said plurality of samples in said step (b-1) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the value of said error

function S is considered as the minimum value; and

(b-3) judging if the number of updates exceeds a predetermined number of times when the value of said error function S is not considered as the minimum value in said step (b-2) and extracting said parameter set P at that time as one that gives the minimum value of said error function S when the number of updates exceeds said predetermined number of times or obtaining the value of said error function S with said parameter set P updated to go back to said step (b-1) when the number of updates does not exceed said predetermined number of times.

19. The method of manufacturing a non-linear element according to claim 18, wherein

the method used in said step (b-a) of extracting said parameter set P that gives the minimum value of said error function S is changed to execute said steps (b-1) to (b-3) of the method of extracting physical model parameters again, instead of extracting said parameter set P at that time as one that gives the minimum value of said error function S, when it is judged that the number of updates exceeds said predetermined number of times in said step (b-3) of the method of extracting physical model parameters.